

Engineering Interpretations

Building Site Development

Soil properties influence development of building sites, including the selection of the site, the design of the structure, construction, post construction performance, and maintenance. Soil limitation ratings of slight, moderate, and severe are given for shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns, landscaping, and golf fairways.

Shallow Excavations

Shallow excavations are trenches or holes dug in the soil to a maximum depth of 5 or 6 feet. They are used for pipelines, sewer lines, telephone and power transmission lines, basements, open ditches, and cemeteries. The ratings are based on the soil properties that influence ease of digging and resistance to sloughing.

Dwellings With or Without Basements

These are single-family houses of three stories or less. The foundation is assumed to be spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or the depth of maximum frost penetration, whichever is deeper, for houses without basements, or at a depth of 7 feet if a basement is constructed. The ratings are based on properties affecting soil strength and settlement under a load, and those that affect excavation and construction costs.

Small Commercial Buildings

Limitation ratings are given for the undisturbed soil on which small commercial buildings of less than three stories without basements are built. The foundation is assumed to be placed on spread footings of reinforced concrete at a depth of 2 feet or the depth of maximum frost penetration, whichever is deeper.

Local Roads and Streets

Limitation ratings are given for the use of soils for construction of improved local roads and streets that have all-weather surfacing, commonly of asphalt, gravel with binder in it, or concrete, and that are expected to carry automobile traffic all year. These roads and streets are graded to shed water, and conventional drainage measures are provided. With the probable exception of the hard surface, roads and streets are built mainly from the soil at hand.

Lawns, Landscaping, and Golf Fairways

The soils are rated for their use in establishing and maintaining turf for lawns and golf fairways and ornamental trees and shrubs for residential type landscaping. The ratings are based on the use of soil material at the location with some land smoothing. Irrigation may or may not be needed and is not a criterion in rating. Traps, trees, roughs, and greens are not considered as part of the golf fairway. The properties considered are those listed that affect plant growth and trafficability after vegetation is established.

This subsection includes:

- **(a) Building Site Development**

Johnson County, Missouri: Detailed Soil Map Legend

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Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BaB: Barco-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Moderately limited ~shrink-swell (moderately limited) ~soft bedrock (slightly limited)	0.39 0.01	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Limited ~low strength (limited) ~shrink-swell (moderately limited)	0.78 0.45	Slightly limited ~depth to bedrock (slightly limited)	0.06
BaC: Barco-----	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited) ~soft bedrock (slightly limited)	0.45 0.15 0.01	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.83 0.45	Limited ~low strength (limited) ~shrink-swell (moderately limited)	0.78 0.45	Slightly limited ~depth to bedrock (slightly limited)	0.06
Bk: Blackoar-----	Very limited ~wetness (very limited) ~flooding (very limited)	1.00 1.00	Very limited ~flooding (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~flooding (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~flooding (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~flooding (moderately limited)	1.00 0.60
BoC2: Bolivar-----	Moderately limited ~hard bedrock (moderately limited) ~shrink-swell (moderately limited) ~slope (slightly limited)	0.47 0.45 0.15	Very limited ~hard bedrock <40" (very limited) ~shrink-swell (moderately limited) ~slope (slightly limited)	1.00 0.39 0.15	Limited ~slope (limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	0.83 0.47 0.45	Very limited ~low strength (very limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00 0.47 0.45	Moderately limited ~depth to bedrock (moderately limited)	0.35
BoD2: Bolivar-----	Limited ~slope (limited) ~hard bedrock (moderately limited)	0.76 0.47	Very limited ~hard bedrock <40" (very limited) ~slope (limited)	1.00 0.76	Very limited ~slope (very limited) ~depth to bedrock (moderately limited)	1.00 0.47	Very limited ~low strength (very limited) ~slope (limited)	1.00 0.63	Limited ~slope (limited) ~depth to bedrock (moderately limited)	0.63 0.35

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Br: Bremer-----	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~depth to bedrock (moderately limited)	0.47		
	Very limited		Very limited		Very limited		Very limited		Limited	
	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.60
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~too clayey (moderately limited)	0.60
	~wetness (limited)	0.60	~shrink-swell (very limited)	1.00	~wetness (limited)	0.60	~flooding (rare) (limited)	0.90		
DpB: Deepwater-----	Moderately limited		Limited		Moderately limited		Very limited		Not limited	
	~shrink-swell (moderately limited)	0.45	~wetness (limited)	0.73	~shrink-swell (moderately limited)	0.45	~low strength (very limited)	1.00		
			~shrink-swell (moderately limited)	0.33	~slope (slightly limited)	0.15	~shrink-swell (moderately limited)	0.45		
DpC2: Deepwater-----	Moderately limited		Limited		Limited		Very limited		Not limited	
	~shrink-swell (moderately limited)	0.45	~wetness (limited)	0.73	~slope (limited)	0.83	~low strength (very limited)	1.00		
	~slope (slightly limited)	0.15	~shrink-swell (moderately limited)	0.33	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
			~slope (slightly limited)	0.15						
Dt: Dockery-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~wetness (very limited)	1.00	~shrink-swell (moderately limited)	0.45	~low strength (very limited)	1.00	~too clayey (moderately limited)	0.30
	~wetness (slightly limited)	0.28	~shrink-swell (moderately limited)	0.45	~wetness (slightly limited)	0.28	~shrink-swell (moderately limited)	0.45	~wetness (slightly limited)	0.28
Fs: Freeburg-----	Very limited		Very limited		Very limited		Very limited		Moderately limited	
	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~low strength (very limited)	1.00	~wetness (moderately limited)	0.45
	~wetness (moderately limited)	0.45	~wetness (very limited)	1.00	~wetness (moderately limited)	0.45	~flooding (rare) (limited)	0.90		

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GoC2: Gorin-----	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.32	~shrink-swell (moderately limited)	0.45	~wetness (moderately limited)	0.45		
	Moderately limited		Very limited		Limited		Very limited		Slightly limited	
	~shrink-swell (moderately limited)	0.45	~wetness (very limited)	1.00	~slope (limited)	0.83	~low strength (very limited)	1.00	~wetness (slightly limited)	0.28
	~wetness (slightly limited)	0.28	~shrink-swell (moderately limited)	0.56	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
Hg: Haig-----	~slope (slightly limited)	0.15	~slope (slightly limited)	0.15	~wetness (slightly limited)	0.28	~wetness (slightly limited)	0.28		
	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.60
	~wetness (limited)	0.60	~shrink-swell (very limited)	1.00	~wetness (limited)	0.60	~shrink-swell (very limited)	1.00		
Hp: Haplaquents----							~wetness (limited)	0.60		
	Not limited		Not limited		Not limited		Very limited ~low strength (very limited)	1.00	Not limited	
Urban land-----	Not rated		Not rated		Not rated		Not rated		Not rated	
HtA: Hartwell-----										
	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.99
	~wetness (limited)	0.99	~shrink-swell (limited)	0.86	~wetness (limited)	0.99	~shrink-swell (very limited)	1.00		
HtB2: Hartwell-----							~wetness (limited)	0.99		
	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.99
	~wetness (limited)	0.99	~shrink-swell (limited)	0.96	~wetness (limited)	0.99	~shrink-swell (very limited)	1.00		

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HxC: Higginsville---					~slope (slightly limited)	0.15	~wetness (limited)	0.99		
	Moderately limited		Very limited		Limited		Very limited		Slightly limited	
	~shrink-swell (moderately limited)	0.45	~wetness (very limited)	1.00	~slope (limited)	0.68	~low strength (very limited)	1.00	~wetness (slightly limited)	0.13
	~wetness (slightly limited)	0.13	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
Ka: Kanima-----					~wetness (slightly limited)	0.13	~wetness (slightly limited)	0.13		
	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
									~too clayey (moderately limited)	0.60
Lg: Lightning silt loam-----									~droughty (moderately limited)	0.57
	Very limited		Very limited		Very limited		Very limited		Limited	
	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~flooding (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.99
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~flooding (very limited)	1.00	~flooding (moderately limited)	0.60
MaB: Macksburg-----					~wetness (limited)	0.99	~shrink-swell (very limited)	1.00		
	Very limited		Very limited		Very limited		Very limited		Not limited	
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00		
			~wetness (limited)	0.95			~shrink-swell (very limited)	1.00		
MdB: Mandeville----										
	Not limited		Very limited		Slightly limited		Very limited		Moderately limited	
			~wetness (very limited)	1.00	~slope (slightly limited)	0.15	~low strength (very limited)	1.00	~depth to bedrock (moderately limited)	0.35

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MdC: Mandeville-----			~soft bedrock (moderately limited)	0.54						
	Slightly limited ~slope (slightly limited)	0.15	Very limited ~wetness (very limited)	1.00	Limited ~slope (limited)	0.83	Very limited ~low strength (very limited)	1.00	Moderately limited ~depth to bedrock (moderately limited)	0.35
			~soft bedrock (moderately limited)	0.54						
			~slope (slightly limited)	0.15						
Nd: Nodaway-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.45	~wetness (limited)	0.61	~shrink-swell (moderately limited)	0.45	~low strength (very limited)	1.00		
			~shrink-swell (moderately limited)	0.45			~shrink-swell (moderately limited)	0.45		
NoD: Norris-----	Limited ~soft bedrock <20" (limited)	0.80	Very limited ~soft bedrock <20" (very limited)	1.00	Very limited ~slope (very limited)	1.00	Limited ~soft bedrock <20" (limited)	0.80	Very limited ~bedrock <20 in. (very limited)	1.00
	~slope (moderately limited)	0.60	~slope (moderately limited)	0.60	~soft bedrock <20" (limited)	0.80	~slope (slightly limited)	0.16	~droughty (limited)	0.98
									~too acid (slightly limited)	0.30
NoF: Norris-----	Very limited ~slope (very limited)	1.00	Very limited ~soft bedrock <20" (very limited)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~droughty (very limited)	1.00
	~soft bedrock <20" (limited)	0.80	~slope (very limited)	1.00	~soft bedrock <20" (limited)	0.80	~soft bedrock <20" (limited)	0.80	~bedrock <20 in. (very limited)	1.00
									~slope (very limited)	1.00
Pd: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PoB: Polo-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Moderately limited ~shrink-swell (moderately limited)	0.45	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Very limited ~low strength (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Not limited	
PoC2: Polo-----	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.83 0.45	Very limited ~low strength (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Not limited	
SaB: Sampsel-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00 0.60
SaC: Sampsel-----	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (limited)	1.00 1.00 0.83	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00 0.60
SaC3: Sampsel-----	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (limited)	1.00 1.00 0.83	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00 0.60
ShB: Sharpsburg-----	Very limited		Very limited		Very limited		Very limited		Not limited	

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00		
					~slope (slightly limited)	0.15	~shrink-swell (very limited)	1.00		
SnD2: Snead-----	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~slope (very limited)	1.00	~shrink-swell (very limited)	1.00	~depth to bedrock (limited)	0.66
	~slope (limited)	0.76	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~slope (limited)	0.63	~slope (limited)	0.63
			~soft bedrock (limited)	0.90					~too clayey (moderately limited)	0.60
SoD: Snead-----	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~slope (very limited)	1.00	~shrink-swell (very limited)	1.00	~depth to bedrock (limited)	0.66
	~slope (moderately limited)	0.60	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~slope (slightly limited)	0.16	~too clayey (moderately limited)	0.60
			~soft bedrock (limited)	0.90					~droughty (slightly limited)	0.26
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
SoF: Snead-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~slope (very limited)	1.00	~slope (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~depth to bedrock (limited)	0.66
			~wetness (very limited)	1.00					~too clayey (moderately limited)	0.60
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Wa: Wabash-----	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~flooding (very limited)	1.00 1.00 1.00 1.00	Very limited ~shrink-swell (very limited) ~flooding (very limited) ~wetness (very limited)	1.00 1.00 1.00 1.00	Very limited ~flooding (very limited) ~shrink-swell (very limited) ~wetness (very limited)	1.00 1.00 1.00 1.00	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00 1.00	Very limited ~wetness (very limited) ~flooding (very limited) ~too clayey (very limited)	1.00 1.00 1.00 1.00
WdB: Weller-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~shrink-swell (very limited) ~wetness (limited)	1.00 0.95	Very limited ~shrink-swell (very limited) ~slope (slightly limited)	1.00 0.15	Very limited ~low strength (very limited) ~shrink-swell (very limited)	1.00 1.00	Not limited	
WfB: Winfield-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Limited ~wetness (limited) ~shrink-swell (moderately limited)	0.99 0.45	Moderately limited ~shrink-swell (moderately limited) ~slope (slightly limited)	0.45 0.15	Very limited ~low strength (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Not limited	
WfC: Winfield-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Limited ~wetness (limited) ~shrink-swell (moderately limited)	0.99 0.45	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.68 0.45	Very limited ~low strength (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Not limited	
WfC3: Winfield-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Limited ~wetness (limited) ~shrink-swell (moderately limited)	0.99 0.45	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.68 0.45	Very limited ~low strength (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Not limited	
Zk: Zook-----	Very limited ~wetness (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~low strength (very limited)	1.00	Very limited ~wetness (very limited)	1.00

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
	~flooding (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~flooding (very limited)	1.00
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~flooding (very limited)	1.00	~too clayey (moderately limited)	0.60